

Application No.: 10/563,255
Art Unit: 3746

Submission under 37 CFR §1.114
Attorney Docket No.: 053549

REMARKS

Please reconsider the application in view of the foregoing amendments and the following remarks.

Status of Claims

Claims 1-9 are pending in the present application. Claim 7 has been withdrawn from consideration. Claims 1, 6, and 8 are herein amended. New claim 10 is added. No new matter has been entered.

Applicants request that the amendment filed on July 12, 2011, after the Final Rejection, not be entered. The present amendments to the claims incorporate all of the desired changes and comply with MPEP §706.07(h)(V). The last entered amendment was filed on May 24, 2010 and it is from these claims that Applicants have submitted the present claim amendments.

Claim Rejections - 35 U.S.C. §103

As to the merits of this case, the Examiner sets forth the following rejections:

Claims 1, 4 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kuramoto (2004/0081565) in further view of Hall et al (6,708,981).

Claims 2, 8-9 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kuramoto/Hall as discussed above, in view of either Weatherston et al. (USP 3,667,874 hereinafter referred to as "Weatherston '874") or Weatherston (USP 3,922,117, hereinafter referred to as Weatherston '117").

Claims 3-4 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kuramoto/Hall as discussed above, in view of either Cringuette et al (4,887,941) or Morgan et al (4850806).

Claim 5 was rejected under 35 U.S.C. 103(a) as being unpatentable over Kuramoto/Hall as discussed above, in view of either Baubron (4,442,353) or Becker (5,584,669).

Claim 6 was rejected under 35 U.S.C. 103(a) as being unpatentable over Kuramoto/Hall as discussed above, in view of Miura et al (6,056,510).

Applicants respectfully traverse these rejections.

Claim 1 has been amended to specify the technical field of the evacuation apparatus and to clearly recite definitions of the booster pump and the main pump. These amendments are intended to eliminate the cited prior-art references and to prevent possible citation of new prior-art references disclosing different technical field and different structures.

The amended claim 1 defines the booster pump as a vacuum pump that is arranged upstream of the main pump and configured to operate at a pumping speed larger than a pumping speed of said main pump such that the pumping speed of the booster pump is large enough to increase the pumping speed of the main pump. This definition indicates that the booster pump serves to increase the pumping speed of the main pump to thereby increase the pumping speed of the evacuation apparatus as a whole.

The amended claim 1 further defines the main pump as a vacuum pump that is operable in a pressure range from an atmospheric pressure to a vacuum. This "vacuum" means a vacuum that is produced in the vacuum chamber of the substrate processing apparatus, as recited in the preamble of claim 1. The "vacuum" to be produced in the vacuum chamber of the substrate processing apparatus is typically less than 10 Pa in order to completely remove the process gas from the vacuum chamber for the next substrate processing step. The evacuation apparatus of claim 1 is intended to be used for the substrate processing procedure.

Kuramoto (US2004/0081565) discloses a vacuum pump for use in a semiconductor fabrication process. However, Kuramoto discloses merely a conventional type of vacuum pump and does not teach or suggest the claimed invention.

As described in Kuramoto, the conventional type of booster pump uses single-stage rotors. This is because the temperature should be kept high so as not to permit reaction product to be solidified and deposited in the booster pump. A heater was even used in the conventional booster in order to keep its temperature high. Use of the single-stage rotors in the booster pump can increase the temperature thereof, compared with the multistage rotors, as discussed in responses filed with the Office. Therefore, in the evacuation apparatus for use in the substrate fabrication, it had been necessary to use the single-stage rotors in the booster pump.

The intended purpose of Kuramoto is to avoid the deposition of the reaction product in the booster pump by increasing the temperature of the booster pump. See paragraphs 0002 and 0006. Therefore, Kuramoto clearly teaches away from using multistage pump rotors in the booster pump, because use of the multistage pump rotor hinders the achievement of the intended purpose of Kuramoto.

Hall (USP 6,708,981) does not teach a booster pump as recited in claim 1. Hall discloses a pressure intensifier 70 which "increases the pressure of the leakage gas from the reservoir 50" and is capable of "pressure intensification up to about 50 bar." See column 4, lines 7 to 9 and lines 44 to 45. As can be seen from these descriptions, the pressure intensifier 70 is not the vacuum pump, but a *compressor*. Therefore, "the pressure intensifier 70" does not fall within the definition of the booster pump of claim 1.

Moreover, according to the definition in claim 1, the booster pump has a pair of multistage Roots-type pump rotors comprising an inlet-side rotor and an outlet-side rotor, and an axial width of said inlet-side rotor is larger than an axial width of said outlet-side rotor. Hall does not teach or suggest these limitations.

Weatherston 1 (USP 3,667,874) and Weatherston 2 (USP 3,922,117) do not disclose a booster pump of claim 1. Both of Weatherston 1 and Weatherston 2 disclose "compressor". According to the definition recited in claim 1, the booster pump is "a vacuum pump" connected to a vacuum chamber. Therefore, "compressor" does not meet the definition of the booster pump of claim 1.

None of the cited prior-art documents disclose the combination of the booster pump having the multistage Roots-type pump rotors and the main pump having the multistage pump rotors. That is, a skilled person in the art at the time of the invention would not have found the claimed invention obvious.

Also, the teaching away would have deterred a person of ordinary skill from combining the references in the manner proposed by the Office. Therefore, Applicants respectfully submit that claims 1-6 and 8-9 are not obvious. Withdrawal of the rejection is thus believed to be in order.

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Conclusion

The Claims have been shown to be allowable over the prior art. Applicants believe that this paper is responsive to each and every ground of rejection cited in the Office Action dated April 14, 2011, and respectfully request favorable action in this application. The Examiner is invited to telephone the undersigned, applicants' attorney of record, to facilitate advancement of the present application.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,
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